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THE FAMILY DENTIST.

THE
FAMILY DENTIST

A
POPULAR TREATISE ON THE TEETH

*How to Preserve them in Health and
Treat them in Disease*

BY
JAMES DOBIE

SURGEON DENTIST

MEMBER OF THE ODONTOLOGICAL SOCIETY OF GREAT BRITAIN

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P R E F A C E .

IN the following pages of this work I have endeavoured to convey to the general reader some idea of what I conceive to be the importance of the teeth, the influence they exercise upon health, and consequent value in the animal economy. It is not intended, and is far from being, a complete manual of dental surgery. It is rather addressed to the general reader than to the dental student; and is intended to be a guide to parents, and those who have the charge of children, pointing out the periods of the eruption of the temporary and permanent teeth, showing the disturbance that takes place on these occasions, and the treatment necessary to give relief; —the diseases to which the teeth are liable, and the best means to be used to arrest their progress. I have also given some hints upon the aliment best suited to the child during the development and

growth of the teeth, which is a most important and critical one in the life of the individual, when the foundation is being laid of the osseous structure, which is the frame work that is to support the other tissues. It is of vital importance that the food supplied to the child, at this time, should be such as contains the elements necessary for the nourishment and growth of bone structure, and the perfect development of the teeth, a subject to which in general too little attention is paid.

I have been induced to write this book in consequence of the great want of correct information upon these subjects, which is displayed in the questions that are daily asked about them in the operating room, and which cannot always be answered there in such a way as to be of much value to the questioner, without taking up more time than can be spared.

8 ST. JAMES PLACE,
PAISLEY, September 1869.

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INTRODUCTION.

THE Teeth perform an important part in the economy of the human system. They are the principal organs necessary for the proper mastication and maceration of our food, thereby preparing it by that due admixture with the saliva which is essential to the healthy process of digestion; an operation upon which much of our comfort and happiness depends. They give expression also to the face, lighting up the smile of beauty with a lustre second only to that more varying light that "burns and soothes by turns," which flashes from the unfathomed depths of the human eye. They give a charm to beauty's smile, and when engaged in deadly contest with the enemy, lend a fierceness to the frown of the warrior. Kinglake, in his "Invasion of the Crimea," writes of Lord Lucan, that "at every fresh access of strenuousness,

and especially at the moments preceding strenuous speech, his face all at once used to light up with a glistening panther-like aspect resulting from the sudden fire of the eye, and the sudden disclosure of the teeth, white, even, and clenched." And again when writing of the Charge of the Light Cavalry Brigade, "The same phenomenon which had enforced the attention of some of Scarlet's dragoons in the morning, now presented itself under other conditions to Lord Cardigan: all along the confronting ranks of the grey-coated horsemen, he found himself hungrily eyed by a band of the human race, whose numberless cages of *teeth* stared out with a wonderful clearness between the writhed lips, and seemed all to be gnashing or clenched."

The teeth are absolutely necessary for speech. The tongue and lips require the support and rest afforded by them, for the emission of certain sounds; and without them, all sound is marred, becomes deficient in volume and tone; and speech, all but inarticulate. The eloquence of the greatest orators,—that mighty power to touch the feelings, rouse the passions, and stir the hearts of men, when used in pleading the cause of the oppressed and down-trodden, exciting the patriot to noble deeds of daring and sacrifice, in defence of father-land, or telling of the great truths that affect our spiritual welfare,—would have failed in its mission, if instead of the clear articulate sound which conveyed their thoughts to

their fellow men, they had been expressed in the inarticulate mumblings that can alone issue from a toothless mouth.

The teeth are also necessary for health, in properly preparing the food before being conveyed to the stomach, there to undergo that process of digestion by which the body is nourished. They are likewise indispensable for appearance, as an otherwise beautiful face wanting the teeth lacks one of its most attractive features; and when the coral lips are parted that should incase pearls pure as ever came from ocean bed, they disclose the black unsightly evidences of corruption and decay, our admiration is suddenly changed to repugnance and disgust.

Our comfort and happiness then, in a great degree, depends upon the sound condition of the teeth, and to obtain that end no trouble should be spared. Therefore I would impress upon those who have the charge and management of children the necessity of giving the condition of the mouth and teeth more attention than they generally receive, and above all things insist upon an early inculcation of cleanliness, and the use of the brush. From the neglect of this many a sound tooth is destroyed, and many a weary hour of pain and suffering is endured that might have been avoided, which ultimately tells upon the constitution of the child. Cleanliness will not give the teeth immunity from disease arising from constitutional causes, but even

where there is a constitutional tendency to disease, it puts them in the best condition to resist its attacks. If I was asked to say in one word what is the best means for preserving the teeth, I would answer, *cleanliness*.

CHAPTER I.

THE TEMPORARY TEETH.

The temporary, deciduous, or milk teeth, are twenty in number. They are divided into three classes, incisors, cuspidati, and molars, and are named according to the purposes for which they are required, or from some other characteristic, such as their shape. There are eight incisors, or cutting teeth; four cuspidati, or one-pointed teeth; and eight molars, or grinding teeth. They are in duplicate; ten in the alveolar ridge of each jaw. The incisors occupy the centre, next the cuspidati, and towards the end of the ridge the molars. They are erupted at different periods, varying slightly in different children; the period of their eruption being affected by constitutional causes.

The following is about the usual time of their eruption :—

4	The Central Incisors ...	5 to 8 months.
4	The Lateral „ ...	7 to 10 „
4	The First Molars ...	12 to 16 „
4	The Cuspidati, or Canine	14 to 18 „
4	The Second Molars ...	20 to 36 „ after birth.

But there are exceptions to this rule, and I have known the canines to have been presented before the first molars. Harris, in his "Principles and Practice of Dental Surgery," states that there is a case on record of a child that did not get any of its teeth till it was ten years old. It would have been interesting to have known whether the teeth that ultimately made their appearance bore the character of the temporary, or the permanent set.

About nine years ago I was consulted by a young woman, nineteen years of age, who never had any teeth, and wished to be supplied with a set of artificial ones. On examining her mouth, I found some six or eight little brown points of dentine sticking out of the gums. They could not be called teeth as they were quite devoid of enamel, and of no characteristic form. I may mention an interesting peculiarity in connection with that mouth. In consequence of the want of the teeth, the tongue had been used to do their work to a certain extent, in sucking and pressing the food against the palate to prepare it for assimilation, until from continued use in that way, it had grown to nearly double its natural size. It was hard, thick, and round, and in a large degree had lost its taper and flexibility. It occupied so large a space, that any attempt to introduce artificial teeth under those conditions would have been a failure. It could only be done by gradually trenching upon the space occupied by the tongue, until sufficient room was obtained to

admit of the introduction of teeth. Speech in this case was very imperfect.

I have also met in the course of my own practice with two remarkable instances of the entire absence, in the one case, of the incisor teeth, and in the other of the incisor and cuspidati.

Some six or eight years ago, I was called upon by Dr. T——, of Dunfermline, to examine the mouth of his little son, then about six years of age. I found nothing peculiar in the superior maxillary; the alveolar ridge was fully developed, and the teeth in their proper places: but in the inferior I found the four incisors, and the cuspidati, were wanting; and the alveolar ridge in the centre was as thin as the blade of a knife, and square, instead of having the rounded appearance of a jaw in its normal condition. There was nothing to indicate that the teeth were there, and I gave it as my opinion that they would never come, in which I was supported by Professor Goodsir, who was subsequently consulted. There is still no appearance of them.

The second case brought under my notice served as a confirmation of the opinion offered in the first. Some two years afterwards, I was consulted by a young gentleman about twenty-five years of age, who wished me to examine a tooth, for the purpose of stopping it, if possible. Before I looked into his mouth, I was struck with the peculiar appearance of the chin and lower lip, which had all the expression

of age, contrasting in a remarkable manner with the upper portion of the face, which had all the roundness and fulness of youth. The peculiarity at once forcibly reminded me of Dr. T——'s little son, although in the child's face the contrast between the appearance of youth and age was not so striking as in the man's. On examination I found he wanted the four incisor teeth of the lower jaw, and that they had never been presented. In this case also the alveolar ridge was very thin and square, deficient in the roundness and fulness of a properly developed jaw. Casts of both cases are in the museum of the College of Dentists, England.

The period of teething is a trying one to the child, and often one of sorrow and bereavement to the parent; but being a natural process, that is, one which every member of the human family must undergo, it is not necessarily dangerous, and only becomes so from ignorance of, and a departure from, natural laws. Hence the importance of sound views in regard to these. Dr. Andrew Combe quotes some striking statistics from the first annual report of the Registrar General, showing the fatal effects of ignorance, and a disregard of the laws which regulate health. In the thirty-two Metropolitan Unions containing a population of 1,594,890, and in the Unions of the Counties of Cornwall, Devonshire, Dorsetshire, Somersetshire, and Wiltshire, containing a larger population of 1,599,024,—the number of deaths ascribed to teething is six times greater in

the impure and crowded atmosphere of the Metropolitan Unions than in the comparatively pure air of the Counties.

According to Dr. Good, the first or active stage of teething begins about the third or fourth month after birth. During that period the child is restless and fretful, and there is a considerably increased flow of saliva. After the sixth month, as the period approaches for their eruption, the pressure of the tooth in the sac, against the gum, excites a degree of irritation that is productive of intense pain, frequently resulting in convulsions. Fortunately, however, the paroxysms are periodical,—the pressure of the protruding tooth not being continuous through the whole period of the teething, but is divided into distinct stages, with intervals of rest. If it were not so wisely ordained, the child would frequently fall a victim to the prolonged intensity of its suffering. When the irritation is merely local, it is usually of short duration, and is marked by a slight tenderness and tumefaction of the gums; but occasionally it is so severe as to affect the functional operations of other parts of the system.

The diseases truly incidental to the irritation of dentition are classified by Dr. Richardson under the following heads: “1st, irritative fever; 2d, some affections of the skin; 3rd, some affections of the mucous membrane; 4th, derangement of the muscular system.” When these symptoms are developed, their treatment belongs rather to the office of the

physician or surgeon than the dentist; so I need not allude to it here, as this work is intended more as a guide to the general reader, than one of instruction to the professional pupil. I may state, however, as a general rule, that during the period of teething the child should be kept in a pure and temperate atmosphere, avoiding extremes or sudden changes, guarding against nervous excitement as much as possible, and frequently using the tepid bath, with gentle and repeated friction over the surface of the body. This exerts a sedative and salutary influence over the nervous system. In all cases, however, where irritation is excessive, the first thing to be done is to examine the gums; and when necessary, make a free incision with the lancet down to the tooth that is the cause of the derangement. The operation gives but little pain to the child, and the relief is immediate, even after prolonged suffering, and frequently supersedes the necessity of other treatment. Above all things avoid the use of those nostrums advertised as "soothing syrups," "mothers' best friends," and other fine sounding names. They are almost all injurious, giving temporary relief it may be, but ultimately at the expense of the health of the child.

CHAPTER II.

PERMANENT TEETH.

As the child advances in years the alveolar arches and jaws are gradually elongated, the necessary space being thus acquired for the large permanent teeth which are to supersede the small temporary ones. At about the sixth year after birth, and before any of the temporary teeth have been shed, the second dentition generally begins with the eruption of the four first molars, called, from the period at which they are erupted, the sixth year teeth. Unfortunately these teeth are very subject to caries, and when they are in that condition, they are frequently mistaken for teeth belonging to the temporary set; and parents being under the impression that they will soon be succeeded by others, make no effort to save them when they are diseased; until, after the child has endured much pain, it is at last taken to the dentist to have the offending member *extracted*. Then, perhaps, for the first time, they learn that it is a tooth belonging to the permanent set. The eruption of the permanent set is generally completed by the twenty-fourth

year after birth. There is no rule, however, without exception, and it is not uncommon to find at thirty, forty, or even fifty years of age the *dentes sapientiæ*, or wisdom teeth, not erupted.

Some five or six years ago, I was consulted by a lady upwards of 68 years of age, who at that advanced period of life was erupting a wisdom tooth in the lower jaw,—the serious functional derangement excited by which had confined her to bed for three weeks. When told that a new tooth was the exciting cause of the fever and pain under which she was labouring, she could not believe it. Happily, however, the free use of the lancet gave her relief, and the appearance shortly afterwards *in propria persona* of the interesting stranger settled the question.

The permanent teeth are considerably larger than the teeth of the temporary set; they are thirty-two in number—sixteen in each jaw—and are the same in name and character as those of the temporary set, whose position they are to occupy, with the exception of the bicuspid, or two-pointed teeth, situated between the canines and molars, and which are not represented by teeth of the same type in the temporary set.

Beginning at the centre of each jaw, the permanent teeth are named and make their appearance about the time stated, as follows:—

The 4 First Molars,	from	5	to	6 years after birth.
The 4 Central Incisors,	„	6	„	8 „
The 4 Lateral Incisors,	„	7	„	9 „
The 4 First Bicuspid,	„	9	„	10 „
The 4 Second Bicuspid,	„	10	„	11 $\frac{1}{2}$ „
The 4 Canines,	„	11	„	12 „
The 4 Second Molars,	„	12	„	14 „
The 4 Third Molars, or				
Wisdom Teeth,	„	17	„	24 „

It will be seen from the above table, that unless from accident or disease, the number of the teeth is never diminished after the first set is completed. The process of change is so beautifully arranged that the first teeth of the permanent set are erupted before the child has begun to shed any of its temporary ones. It is seldom that the second dentition is accompanied with any serious disorders or disarrangements of the natural functions. At the time of the eruption of the second dentition the subjects are more developed, and the constitution of the child having acquired vigour and strength, is better able to resist any slight morbid impressions that may arise; besides, when the temporary teeth drop out, the permanent ones that are to supersede them are generally so far advanced as almost immediately to take their place. Even when that is not the case, the cicatrix that forms over the permanent tooth after the removal of its predecessor, is of such a texture that it readily yields to the action of the

absorbents without causing much local disturbance. The process of development is slower, and is spread over a greater number of years in the second, than it is in the first dentition; from eight to twelve years being required to complete in the second, that which was done in half the time in the first. It is only on the occasion of the new molar, and more especially the wisdom teeth erupting, or in consequence of some anomaly in the direction in which one or more of the other teeth is presented, that any serious derangement takes place requiring professional assistance; but when it does occur no time should be lost in applying for that assistance, as delay only increases the difficulty.

CHAPTER III.

SOME OF THE CAUSES OF IRREGULARITY OF THE TEETH.

It rarely happens that there is any irregularity in the position of the temporary teeth. Those "little pearls," as they are not inaptly called by an American writer, generally make their appearance in a regular arch, giving a new beauty to the rosy lips, and lighting up the merry laugh of childhood. But with the permanent set irregularity is a matter of frequent occurrence, and is much to be deplored, as upon the regularity of the teeth, their health, and the beauty of the mouth, in a large degree, depend.

The temporary teeth are only intended to last for a few years; and parents, in general, do not think them of sufficient importance to take much care in their preservation, which is a great mistake. By the same attention to cleanliness that is bestowed upon the outward person, and a timely application of remedial measures on the first appearance of disease, the child might be saved from many a weary hour of dreadful suffering and distress. It

cannot be too strongly impressed upon all those who have the care of children, that the premature loss, by extraction, or otherwise, of the temporary teeth, is a most frequent cause of irregularity in the permanent set. Their removal before the permanent ones are sufficiently developed to take their places, permits the alveolus to contract, sometimes causing a deformity that is in all cases difficult to correct.

Irregularity is frequently produced by the late development of a permanent tooth, the eruption of supernumerary teeth, and frequently from the pressure of the *dentes sapientiæ* (wisdom teeth). These last, when they make their appearance, generally produce a considerable amount of irritation and pain, sometimes causing an injurious lateral pressure on the other teeth, even in a previously well developed and regular set. There are other causes of irregularity, such as the permanent teeth being presented before the fangs of the temporary ones are absorbed; the obstruction caused thereby forcing them into irregular and unnatural positions. Sometimes, the dental arch of the upper jaw is so much contracted, that the central incisors project so as to prevent the upper lip from covering them. This is fortunately a rare form of perversion, as it is a very unsightly one, and is a form of irregularity not easily corrected. In certain cases the superior front incisors make their appearance behind the front incisors of the deciduous set; and not having sufficient space between the lateral incisors to admit of

them occupying their proper position, this is a condition of things that generally creates alarm to parents; but the remedy is very simple. The danger lies in extracting too soon. As the teeth are developed, the continual pressure of the tongue will help to put them into their position; and when the space between the laterals has sufficiently increased, so as to admit of the centrals occupying their proper place, then the temporary incisors may be extracted. A very common irregularity in the presentation of the cuspidati (canine tooth), is its coming out above the bicuspid, which besides giving a very unpleasant expression to the face, is often a source of annoyance to the upper lip, producing excoriation, and in some cases ulceration. They generally lie high up in the alveolar process, and may be detected by a protuberance on the labial surface of the gum—the bicuspid generally being close to the lateral incisors. When that condition of things occurs, it is best not to wait for the canines piercing the gums, but to extract either of the bicuspid, or the first molar—the one which, on examination, shows symptoms of decay. If all are sound, then I advise the extraction of the first bicuspid; but it is bad practice to extract the canines, as that would destroy the facial angle, and the beauty and contour of the mouth.

Almost every irregularity in the presentation of the teeth demands the aid of a skilled dentist to correct it, many cases requiring ingenious mechanical contrivances, to be worn in the mouth for that pur-

pose. The pressure necessary to correct the irregularity must be applied continuously, but gently, not to excite inflammation; and as there is a predisposition in every instance to return to the original condition in which they were presented, time is a necessary element to ensure success. The patient, therefore, must not expect the work of correction to be done without exercising patience, and suffering some inconvenience. All the evils, however, are not borne by the patient, as there is scarcely a case of irregularity carried to a successful issue that is remunerative to the practitioner; and were it not for the higher pleasure, arising from a sense of duty fulfilled, they would seldom be undertaken.

CHAPTER IV.

THE COMPOSITION OF THE TEETH.

Before proceeding to treat of the diseases incidental to the teeth, it will be advisable to see what they are composed of. A tooth is a compound structure, consisting of cementum, enamel, dentine, and pulp.

The pulp is enclosed in the centre of the tooth, and is the part from which the dentine is formed. It is a highly vascular and nervous substance, of a reddish-grey colour, and exquisitely sensitive. It is principally composed of minute vesicular cells disposed in concentric layers, and is liberally supplied with blood vessels, the ramifications of which are distributed through its entire substance.

The dentine is a very hard dense substance, composing the great bulk of the tooth,—the larger portion of the crown, and nearly the whole of the root. It is an exceedingly sensitive substance, as we discover if by any accident a portion of the enamel of the crown of the tooth is broken off, and the dentine

exposed, when the slightest variation from the temperature of the mouth, or the contact of any foreign body, produces extreme pain; even contact with the tongue, in some instances, causes suffering. It is more sensitive in the teeth of young, than in those of older persons, especially when it is attacked by caries; and is more so in those teeth which are rapidly decaying, than in those where the process of destruction is slower. When the decomposing part is of a light colour, then the disease is rapid in its progress; but when it is of a deep brown colour, and comparatively hard, then the progress of the disease is slower. After a portion of dentine has been exposed for sometime, it loses its acute sensitiveness; and if the pulp is destroyed, the sensitiveness of the whole of the dentine is also destroyed.

Analysis of Dentine according to Berzelius :

Phosphate of lime	.	.	.	62.0
Fluate of lime	.	.	.	2.0
Carbonate of lime	.	.	.	5.5
Phosphate of magnesia	.	.	.	1.0
Soda and muriate of soda	.	.	.	1.5
Gelatine and water	.	.	.	28.0
				100

Enamel is the hardest of all animal substances; and in a healthy tooth is either of a pearly white, or slightly tinged with yellow. It varies in density, being harder in some teeth than in others; and is

so disposed as to be thickest at those parts which are most exposed to friction, such as the tops of the molar teeth, the cups of the bicuspid and cuspidati, and the cutting edge of the incisors. Enamel is composed of prisms or fibres, which, according to Naysmith, are cellular. Each cell is semicircular, thus having by its structural form, a power of resisting mechanical force which it would not otherwise have, in a merely fibrous structure.

Analysis of Enamel according to Berzelius :

Phosphate of lime	.	.	.	85.3
Fluate of lime	.	.	.	3.2
Carbonate of lime	.	.	.	8.0
Phosphate of magnesia	.	.	.	1.0
Soda and muriate of soda	.	.	.	1.5
Animal matter and water	.	.	.	1.0
				100

The cementum, or crusta petrosa, covers the roots of the teeth, commencing where the enamel terminates, and gradually increases in thickness to the apex. In many animals it covers the crowns of the teeth, as in the molar tooth of the elephant, where it unites vertical plates of enamel into a solid tooth. Cementum corresponds in all special particulars with osseous tissue; and when of sufficient thickness is traversed by vessels capable of conveying red blood. It contains a larger portion of organic matter than dentine,

and hence is more sensitive. When the neck of a tooth is exposed by recession of the gums, the slightest touch of the cementum is followed by the most acute pain.

Analysis of Cementum according to Von Bibra.

Organic matters	.	.	.	29·42
Inorganic matters	.	.	.	70·58
				100

CHAPTER V.

CARIES.

In treating of the diseases of the teeth, caries naturally takes the first place, as it is the disease to which they are most subject, and the one which is most fatal to their usefulness. Enamel and dentine suffer most from caries, but the cementum is not altogether free from its operation. Caries is sometimes very rapid in its destructive progress; and the greater portion of a tooth may be involved without causing much pain, until from the pressure of the diseased tissue upon, or the admission of air to, the dental pulp, inflammation of that membrane is excited. Generally, however, the progress of the disease is much slower; and the pain and discomfort it occasions gives unmistakable notice of its presence before it has reached the dental pulp. The crowns and necks of the teeth are both subject to caries, but some parts are more liable than others; as for instance, the grinding surfaces of the molars, especially where the enamel has been imperfectly developed and the union is incomplete; the approxi-

mal surfaces of the incisors, canines, and bicuspid; or wherever any imperfection of the enamel exists. Caries sometimes attacks the necks of the teeth at the cementum, on the bucal, or labial surfaces, commencing at a point, or a thin line close to the margin of the gum, and gradually extends inwards, from the cementum, to the dentine, till it completely undermines the crown, leaving its external form intact and apparently sound, but in reality, a hollow, worthless shell, ready to crumble and fall at the first assault. When a tooth is attacked by caries, there is always a change of colour at the diseased point. If it is in the grinding surfaces of the molars, in consequence of imperfect development of the enamel in the fissures, then it is indicated by a dark brown spot; but if a part of the enamel, free from any indenture or fissure, is attacked, the first sign of its presence is a loss of translucency at the affected part, which assumes a dead white, chalky appearance, gradually changing to a brown, more or less dark. When it attacks the cementum, its presence is detected by a brown spot, or thin brown line close to the neck of the tooth, where from some cause the gum has receded, and left the cementum exposed.

In teeth that are of a soft structure, in consequence of a deficiency of lime in their organization, or where it has been destroyed by an excess of acid in the oral fluids, caries is always light in colour, and rapid in its destructive progress. When teeth that are dense in structure are attacked by caries, it

is generally of a dark brown colour, which is at all times a sure indication that the disease is not extending very rapidly. Indeed, I have seen cases where the caries has been almost black, and where the disease has remained nearly stationary for years; but these are exceptional.

THE CAUSES OF CARIES.—There is much diversity of opinion as to how caries is developed, some writers arguing that it is the result of chemical agency, and others that it is caused by diseased action upon a vital organism. It is unnecessary here to follow the argument in support of either theory: it may be sufficient to state that the preponderance of evidence is in favour of an external operating cause, by which means, some portion of the enamel is destroyed, either by accident, or by pressure, as is frequently the case at the approximal surfaces, when the teeth are pressing upon one another; or by chemical agency acting upon and destroying the enamel, thereby exposing the dentine to the action of the same destroying agent, which removes the phosphate of lime from the gelatine, leaving the dentine of a consistency capable of being easily cut with a knife. In the absence of any such agent, and when the fluids of the mouth are in their normal condition, the dentine may be exposed without suffering from caries. It is the custom with several of the tribes of central Africa to file their teeth to a point, like the teeth of a saw. Dr Livingstone mentions several tribes having their

teeth filed in that manner; and describes it as giving a horrid expression to the features, comparing the smile of a woman to the grin of a shark. I quote from memory, but I think he says nothing about the teeth so filed being more subject to decay than those of the neighbouring tribes whose teeth are not filed: and the Dr is too close an observer to have allowed a circumstance of that kind to pass unnoticed had it been so. An older writer, also, mentions the fact that the negroes of Abyssinia file their teeth to a point, and that they remain beautifully white after the operation. It would appear, then, that the oral fluids when in a normal condition are not injurious to the dentine; and it is only when they have undergone some change, either from local or constitutional causes, that the dentine suffers: and I believe in many cases the file may be successfully used to remove caries from the dentine, if the part filed is thoroughly polished and kept clean; but as there are certain inherited conditions that render the teeth more susceptible to the influence of external causes than others, much care is necessary in the use of the file.

Dr Richardson says, "a degraded condition of the system, whether that be produced by hereditary taint, by scrofula, by mercury, or by syphilis, leads to imperfect development of the hard dentinal structures, and in so far favours the influence of external causes; but these constitutional ailments are not alone sufficient to produce caries." A proof that

caries is produced by external agency is to be found in the fact, that we never see it commencing within the dentinal structure of the tooth and extending outwards towards the enamel; but we invariably find the first symptoms of disease either in the enamel or the cementum, and extending inwards to the dentine. When I first commenced the study of dentistry, there was scarcely anything used to replace teeth that had been lost, but the tooth of the walrus or hippopotamus, carved into the shape of teeth, or used as a base for the insertion of natural teeth. Natural teeth were also mounted on gold plate; and during some fifteen or sixteen years practice at the workbench, I have cut into many thousands of natural teeth, but have never found one where I could detect the slightest symptom of the disease commencing internally and extending outwards, but many hundreds where it was clearly traced from without, extending inwards.

Amongst the indirect causes that produce caries, Harris includes the deposition of tartar. My observation leads to the very opposite conclusion. Indeed, where the teeth are covered by hard tartar, they are always free from caries. When bone dentures have been worn in the lower jaw, (where the greatest accumulation of tartar is generally found) I have often seen the whole of the bone destroyed except that portion which was covered by the tartar, viz., that part which was nearest to the sublingual gland, where I have often found it so

thoroughly protected, that even the dye used to colour the bone in imitation of the gum, has been found, on the removal of the tartar, to be quite fresh and bright. I have several specimens in that condition.

PREVENTION OF CARIES.—Before proceeding to the remedial treatment for caries, I think it advisable to say a few words about the best way to prevent it, believing in the force of the old proverb, that “prevention is better than cure.”

The means of prevention, then, are simple and within the reach of all, consisting principally in a strict attention to cleanliness and the regular use of the brush. In those cases where the teeth are very close together, much good will be obtained by passing a waxed floss-silk thread between them once a day; it will relieve the pressure, and remove any particles of food that may have lodged between the teeth, the decomposition of which, in that position, tends to the destruction of the enamel, and consequent exposure of the dentine to the action of the oral fluids, which is the chief agent in producing caries.

By attention to the treatment indicated above, caries, and other diseases injurious to the teeth, might in many cases be averted; and in all, it will tend to retard the progress of disease. As there can be no doubt that there are agents in the mouth capable of decomposing the dental tissues, it is necessary before we can point a remedy to ascertain

the source of those destructive agents, which is generally to be found in the oral fluids. In their normal conditions, the secretion from the mucous membrane is slightly acid, and the saliva is slightly alkaline. When the amount of each is about equal we have then a neutral fluid; but there are certain conditions of health in which the saliva becomes acid. There then being an excess of acid in the oral fluids, it tends to destroy the integrity of the enamel, especially whenever it is defective—the dentine then being exposed to the same destructive agent, the teeth are rapidly destroyed by caries. Another condition in which the oral fluids become acid, is, when there is a constitutional deficiency in the salivary secretion, and an excess of the mucous secretion, either, from some local or general cause. When that is the case, there are generally many carious teeth in the mouth, the gums have a thick and vascular appearance, and are covered with a coating of adhesive mucous that may be easily drawn from them in strings. In all those cases where caries is induced by an excess of acid in the oral fluids, whether caused by an increase of the mucous secretion, a deficiency, or abnormal condition of the salivary secretion, or is eructated from the stomach, the internal use of lime water, and the external application of prepared chalk as a dentifrice, are the best means for the prevention of caries. The lime water, by altering the blood, tends to modify the character of the decay, while the chalk acts locally upon the oral fluids, neutralising their acidity.

TREATMENT OF CARIES.—When once caries has attacked the dentine, the successful treatment for its eradication is purely the province of the dentist, requiring his best skill and attention. So I will do little more here than indicate the rationale of the treatment, as the sooner the assistance of a qualified practitioner is sought the better; for, when once the dentine is attacked by caries, the process of destruction goes on until the whole tooth is involved, if no means are taken to arrest the decay. This, unfortunately, is too often the case, as the aid of the dentist is seldom sought until toothache gives notice that the pulp has been reached, after which the chances of having a successful operation are reduced.

In the treatment of caries two methods are adopted; both, however, having the same end in view, viz., the entire removal of the diseased tissue. The first method should only be employed in the earliest stage of the disease; and consists in removing with a file the whole of the diseased, with a portion of the sound tissue, and carefully polishing the surface to the highest possible degree. This operation can only be performed with success when the disease is situated in the approximal surfaces, and has not extended far into the dentine. Except at the very commencement of the disease, I have no great faith in the file, although it has several able advocates amongst some of our first practitioners. The other method consists in the removal of the carious dentine along with a portion of the sound,

and properly preparing the cavity for being plugged with some indestructible inorganic material, as gold, various amalgams of silver in combination with other metals, oxide of zinc, etc.

There are few diseases that afflict the human frame more under the control of the skilful operator than the one under consideration. Almost every case may be successfully treated, if taken in time; but the success of the operation depends in a large degree upon the skill and ability with which it is performed: and it is perhaps more frequently performed improperly than any other operation on the teeth. There are some cases, however, in which failure is not to be attributed to a want of skill on the part of the operator, but rather to causes beyond his control. In some cases we find, that after a tooth has been stopped in one part, the disease will break out in another part of the same tooth, shewing a predisposition to caries that is difficult to overcome. In my own practice I have a case where a lower molar tooth is stopped in five places. The first stopping I put in about fifteen years ago, and the last about two years since. In this case the reappearance of the disease arose from imperfect development of the enamel, along with a pre-disposition to caries from acidity.

There are cases also where, in consequence of a failure in the general health of the patient, from the effect of typhoid fever, or dyspepsia, and consequent vitiation of the oral fluids, stopping will fail in spite

of the best skill and attention on the part of the operator. How much more likely, then, are stoppings to be failures, when they are attempted by those who, without any professional training, are ignorant alike of the principle and practice; and who think they have done all that is necessary when they have dried up the cavity and put in some cheap amalgam, leaving the rest to chance?

There are certain conditions that are absolutely necessary to ensure success in the operation of stopping. First, the cavity must be properly prepared, so as to retain the stopping in such a manner as to exclude the fluids of the mouth. Second, the metal used must be properly prepared and thoroughly packed. Third, the stopping must be finished in such a way that the surface will be free from the chance of any mechanical injury, by being made flush with the outer margin of the cavity. And Fourth, the tooth to be stopped must be free from pain, whether arising from inflammation of the pulp, or from any other cause.

There are some constitutions where the dentine is exceedingly sensitive; and in preparing a tooth for stopping, when it is in that condition, the patient will shrink at every touch of the excavator. In such circumstances, before proceeding to the removal of the affected dentine, it is necessary to apply some agent to reduce the high degree of sensibility. There are several agents used for that purpose, but I will only mention such as may be used by the patient

without the risk of mischief, such as the frequent application of camphorated spirit on a pledget of cotton wool, or a small quantity of creosote and tannin on a little cotton wool; first drying out the cavity, and after applying the creosote and tannin, plugging up the cavity with bees' wax or gum-mastic. There are other more powerful agents used, but as these are attended with some risk, they should only be applied by a professional man.

I have dwelt thus long on caries and its treatment, because the teeth are more frequently lost from caries than any other cause; and in almost every instance, a *timely* application of the proper treatment would save them.

CHAPTER VI.

NECROSIS OF THE TEETH.

Necrosis is the term applied to a tooth, or bone, to signify its death or mortification. When necrosis takes place in a bone, the dead part is exfoliated, and new bone is reproduced, supplying to a great extent the place of the dead bone. But the teeth have no such recuperative powers. "Bone draws its supply of blood from many sources, direct and indirect; and the same may be said of the nerve distribution: but a tooth being fed by one artery, and one nerve, through the dental pulp," when once that source of supply is withdrawn, there is no restoration. For a dead tooth there is no resurrection; and though it may remain for some time in situ, without doing much mischief, it must ultimately go. The dead and the living cannot agree; and if it is not removed by external agency, nature will throw it out by a more severe process than the use of the forceps would prove.

Necrosis of one or more teeth may be the result of fever; or it may be caused by external mechanical agency, as by a blow of sufficient force to destroy the vascular connexions of the tooth; or by inflammation of the dental pulp, resulting in the destruction of that membrane, and consequent loss of vitality in the dentine. If the periosteum be also destroyed, the necrosis or death is then complete; in which case the tooth had better be removed, to prevent injury resulting to the alveolar processes, and the adjacent teeth.

What I have said applies to cases of perfect necrosis; but there is also a partial necrosis, the result of disease of the periosteum or of the dental pulp. The pulp may be destroyed, causing necrosis of the dentine, and yet the tooth remain serviceable for many years, with little inconvenience, if the periosteum and cementum remain in their normal conditions. A partial necrosis may be the result of disease of the periosteum; and if the vitality of the pulp is not impaired, the tooth may still be rendered useful. When a tooth is necrosed, it is easily detected by its dark appearance, and loss of translucency, caused by the decomposition of the blood globules, and the solution of the colouring matter in the fluids present, permeating the dentine. In the treatment of necrosis little can be done. If it is only partial, I believe the tooth may be retained in its position by the timely application of leeches; but as nothing can be done to restore the lost vitality, it

will always be an imperfect instrument: and if it is causing local mischief, such as alveolar abscess, it is better out. "Better a toom house than an ill tenant."

CHAPTER VII.

EXOSTOSIS OF THE TEETH.

Exostosis is a secretion or deposit of osseous or bony matter on the cementum; a tissue which, as stated in a preceding part of this work, bears a close resemblance to bone. The enlargement generally begins at the extremity, and extends upwards; it rarely begins at the side. There may be considerable enlargement of the root of a tooth by exostosis, without causing much inconvenience. It is only when the thickening becomes considerable, that symptoms of uneasiness are felt. The symptoms, however, are not always referable to the offending tooth, the pain being sometimes in the head, or face, or neck; so that it is difficult to detect the member offending, as externally the tooth may appear quite sound and healthy: indeed, the crown will give no evidence against the mischief going on at the root. Tomes, in his "System of Dental Surgery," mentions a case under his treatment, where the patient had been treated for ticdouloureux for several years, and

had submitted to the usual treatment without advantage. She stated that the pain came on gradually, at irregular intervals, lasting from twelve to fourteen hours; or, until exhausted by suffering, or narcotised by opium, she fell asleep. The affected teeth appeared quite healthy; but the patient stated that though they did not ache, yet they were seldom free from an uneasy sensation. Ultimately all the teeth in the upper jaw had to be extracted before she got relief.

It is difficult to diagnose for exostosis. If the symptoms are well marked, then "the first local symptom is a sensation of fulness in the lower part of the tooth. It is described as not very painful, but annoying; and attended with a feeling of increased warmth, and perhaps throbbing. The patient may be conversant with the fact that the pain is external to the tooth; or at all events that it is different to what is known as common toothache. Sometimes it is increased by pressure made upon the tooth, or by a slight blow inflicted upon it, or by shaking it; but this is by no means to be considered as an invariable rule. It is often attended by pains in neighbouring parts, which are either reflected through nerves, or are occurring in the branches of the fifth pair, from independent mischief in the nerve sheath." *

* Dr Richardson—"The Pathological and General History of Necrosis, Exostosis, and Bone."

In some cases the growth of the cementum is so great as almost to double the size of the fang; and occasionally two teeth are quite united by the bony secretion, the intervening alveolar seeming to be quite absorbed. I had a case in my own practice, where the first and second molar of the left jaw were united: and in extracting the one for caries, the other came with it, fracturing a portion of the alveolar. When the disease has once established itself, it admits of no cure.

CHAPTER VIII.

INFLAMMATION OF THE DENTAL PULP.

The dental pulp being a highly vascular and nervous substance, is exquisitely sensitive; and being confined in a bony canal, inflammation of the pulp is always accompanied with severe pain, aggravated no doubt by the local constriction.

Inflammation of the pulp may be either chronic or acute. Chronic inflammation differs from the acute in being affected by sudden changes of temperature, or by the action of salt, sugar, or acid. It is frequently the case, that in chronic inflammation of the pulp, no pain is felt in the tooth which is the seat of the disease; but the patient suffers from severe sympathetic pain in the face, head, or neck.

Acute inflammation of the pulp is more rapid in its progress; is consequent upon exposure, or pressure, either by carious dentine, or by some extraneous substance lodged in the cavity of the tooth. The action of the oral fluids sometimes acts as an irritant;

for we find, that as the decomposition of the dentine extends, the liability of the tooth to ache increases.

The symptoms of both acute and chronic inflammation are modified by the health and temperament of the individual. In the treatment we must be guided by the extent the disease has been allowed to run before relief is applied for, and the condition of the surrounding dentine. If the inflammation has not extended to the investing membrane, then there is good hope of success from remedial treatment, which must be of the same nature as for inflammation of any other part of the body. If the irritation is caused by the pressure of some foreign body in the cavity, or decayed dentine, the cavity must be carefully freed from the cause of irritation, taking care to avoid touching the pulp in so doing; and then frequently applying a pledget of cotton wool, saturated in camphorated spirit, or a solution of gum camphor in chloroform. I have found the addition of a little tannin to the camphorated spirit of much value: and when acid is the cause of the pain, the application of carbonate of soda is serviceable in giving temporary relief. It is frequently advisable to devitalise the pulp before proceeding to fill the cavity; in which case an escharotic, as arsenic, or chloride zinc, is used: but as much caution is necessary in the application of these agents, especially the former, it should only be used by those who are acquainted with its action, and never by the patient.

CHAPTER IX.

INFLAMMATION OF THE ALVEOLAR PERIOSTEUM.

The dental periosteum is very liable to disease; perhaps more so than any other membrane of the same class: and after inflammation has once been excited, the morbid condition is ever afterwards readily assumed. A frequent cause of inflammation of the dental periosteum, is inflammation and subsequent decomposition of the dental pulp—whether caused by disease or by mechanical injury—resulting, if allowed to run its course, in the formation of pus and abscess. It may be the result of the constitutional effects of mercury, or be excited by severe concussion of the teeth, or it may be caused by what is called taking a cold; in which case the disease has generally been developed at some antecedent period, and is re-excited by the general derangement of the system. The disease is sometimes of a rheumatic character, when the inflammation seldom extends beyond a congested state of the blood vessels, suppurating only;

in severe cases, the pus exuding between the gums and the necks of the teeth, and seldom forming an abscess.

In acute local inflammation of the periosteum, the symptoms in the incipient stage of the disease are marked by a sense of uneasiness at the root of the affected tooth or stump, slight soreness on shutting the jaws, a feeling, as if the offending tooth was raised above the others, and a desire to press it with the fingers or to slightly shake it. Pressure of the tooth into the socket only gives temporary relief, the pain returning again when the pressure is taken away. As the disease proceeds the symptoms are more severe, the tooth becomes exceedingly painful to the touch, with throbbing at the root, accompanied with sympathetic pain in the other teeth, and sometimes in the ear or eye of the side affected. The gum opposite the offending tooth assumes a deeper colour, and becomes swollen and tender, resulting, if the disease is allowed to run its course, in abscess. If the disease be very severe, and its progress be unarrested, it sometimes extends to the periosteum of the jaw, terminating frequently in necrosis of considerable portions of the jaw. I had a case, where nearly one third of the lower jaw of a boy about twelve years of age was necrosed from the cupidati to the condyle, and had to be removed, the result of inflammation of the alveolar periosteum, which had been neglected in the early stage of the disease. The dead bone contained the permanent teeth that had not been

erupted; and there were four fistulous openings, two in the cheek and two in the neck.

If the disease attacks the periosteum of the bicuspid or molar teeth of the upper jaw, the pus will sometimes find its way into the cavity of the antrum, causing considerable local disturbance and mischief, from the extravasation of pus into it. Sometimes, too, the pus finds its way to the outside of the cheek, instead of discharging through the gums. When these fistulous openings are external, they are only cured by removing the exciting cause, be it tooth or stump.

The treatment must be varied according to the cause, the time the disease has run, and its condition at the time relief is sought. There is no uniform treatment; it must vary in this as in every other case, according to the cause of the disease, the period it has run, and the condition of the surrounding tissues at the time relief is sought. In the early stages of the disease, the prompt application of leeches, and the administration of a mild cathartic, is the best means to arrest its extension. But should these means fail in preventing the formation of pus, and the tooth or root which is the exciting cause is of no value, it should be extracted, which in most cases will at once give relief; but if the patient will not submit to the operation, then a way for the escape of the pus through the gums should be promoted by the application of hot fomentations to the mouth, or of a poultice made of the fleshy part of a fig warmed

and applied to the gum. By no means should fomentations or poultices be applied externally, as they do little good so used, but may do much harm, by promoting the discharge of pus through the cheek, which always leaves an unsightly mark behind, that disfigures the face.

As soon as fluctuation is perceived, which will be ascertained by slight pressure of the finger, the lancet will give an opening for the discharge of the purulent matter, after which the swelling of the gums and all the other disagreeable symptoms quickly subside, if the patient is in otherwise good health. If the disease arises from the constitutional effects of mercury, or a strumous diathesis, and the health of the patient is indifferent, then in addition to the free use of the lancet, constitutional treatment will be necessary, for which purpose 1 gr. iodide of potassium two or three times a day, along with generous diet, will be found of much benefit. If the inflammation is caused by a stopped tooth, a free vent must be given to the pus, and if the pulp be inflamed, apply creosote to the cavity; and if that is not successful, the pulp should be destroyed at once and removed, the cavity cleansed with camphorated spirit or iodine and creosote, and then plugged.

CHAPTER X.

THE GUMS AND SOME OF THEIR DISEASES.

The gums are composed of thick mucous membrane, their internal structure being fibro-cartilaginous. They are closely adherent to the periosteum of the alveolar processes, and also to the periosteum of the teeth clinging closely to the cementum, filling up the interdental spaces and tracing the outline of the enamel, producing that beautiful festooned appearance which is so rich a coral setting to the pearly teeth. In healthy individuals, possessing a sound constitution, the gums are of a pale rose red colour, a firm, elastic consistency, combined with a remarkable degree of insensibility. The surfaces have a roughened appearance, caused by innumerable papilla. When from the constitutional effects of mercury, scrofula, or scurvy, the gums are diseased, they become exceedingly tender on the slightest injury; and possessing a high degree of vascularity, they are a pretty sure index to the state of the constitutional health. They are often affected by

remedies used for the cure of other diseases, as in the case where mercury is administered: indeed, they are the most perfect index of the extent to which that agent has affected the constitution. Tomes, in his "Dental Surgery," says, "The state of gum I am about to describe is, in fact, a premonitory sign of ptyalism; for should it appear, and the mercury be immediately discontinued, yet salivation will come on. The sign is this: the adherent portion of the mucous membrane of the gums assumes an opaque white colour, contrasting strongly with the non-adherent portion, which preserves its natural hue or becomes more red. The free edge of the gums is moveable, but that part which lies over the edge of the alveoli is firmly tied down to the periosteum; and as the edges of the alveoli present a festooned line, so the whitened mucous membrane presents corresponding undulations. Again, where the mucous membrane is loosely reflected from the gum to the cheek, the natural colour is preserved. The whiteness of the gums is produced by an increased secretion of epithelium, which, from being thicker and more opaque than in the healthy state, renders the colour given by the vessels to the subjacent tissue less apparent.

"The surface of the mucous membrane, when deprived of epithelium, is studded over with innumerable small conical elevations or papilla. The thickened epithelium is readily rubbed off the tops of the papilla, while it retains its full thickness in

the intervening depressions: however, if closely inspected, the gums will not be seen to present a uniform white hue but a mottled aspect. With the increased thickness there is a decrease of tenacity between the scales that form the epithelium, for the surface may be much more readily rubbed off than when in a natural state. This curious and useful premonitory state of coming ptyalism was, I believe, first noticed and its value pointed out by Mr Crofe."*

In mercurial inflammation of the gums, when they continue spongy after the mineral has been discontinued, the bowels should be kept open with saline purgatives; and a wash with chloride of soda, or a solution of chlorinated soda diluted with from 8 to 12 parts water, may be used to correct the offensive fetor of the breath.

The treatment of those diseases of the gums which have a constitutional origin, is the province of the surgeon rather than that of the dentist; yet they not unfrequently come under the notice of the latter for treatment. In those conditions, when the disease is constitutional, local remedies are of no value, unless in conjunction with, or following the constitutional treatment.

Acute inflammation of the gums is purely local, the effect of irritation excited by dentition, periostitis, or a broken stump. It often extends to the submaxillary gland and the muscles of the face, and is

* Tomes' "System of Dental Surgery."

attended by swelling. Chronic inflammation of the gums is frequently accompanied by suppuration and their recession from the necks of the teeth. The gums, losing their festooned appearance, become thick and vascular, bleeding on the slightest injury; and on being pressed, discharge purulent matter from between the necks of the teeth and the gums, destroying the dental periosteum, ultimately causing the teeth to fall out. When those conditions are excited by the presence of tartar, they are generally developed first at the gums of the incisors of the lower jaw, opposite the duct of the sublingual gland, and at the gums of the second molars of the upper jaw, opposite the duct of the parotid gland. Besides the presence of tartar, there are other exciting causes of inflammation of the gums, such as necrosed, or loose teeth, exostosis, the stopping of a tooth extending beyond the margin of the cavity, or irregularity of the teeth, favouring the deposition of extraneous matters, such as food etc.

THE TREATMENT.—Having ascertained the exciting cause, its removal is necessarily the first thing that demands our attention; and if it is caused by a loose tooth, tartar, or any extraneous matter irritating the gum, after the removal nothing else is necessary than the use of some astringent tincture, for which purpose I know nothing better than catechu and camphor in equal parts, with the addition of about 1 gr. of tannin to the ounce of tincture; dilute at the time of using it in about 2 parts of water.

In inflammation of the gums, excited by periostitis, the treatment has already been described under that head. If tartar is the cause it should be at once removed; indeed it should never be permitted to accumulate: but if the gums are very much swollen and spongy, I advise the use of an astringent tincture applied with the brush for two or three days, before proceeding to its removal.

Polypus, or fungus gum, is frequently found in connection with decayed teeth, especially in those conditions where a sharp margin of decay presents a ragged edge below the surface of the gums. It may sometimes be described as an extension of the dental pulp, and is frequently met with in young patients, where the tooth has decayed before it has been fully developed, and the pulp canal is still wide. It also appears as an overgrowth of the gums, excited by the sharp ragged edge of a decayed tooth, the tumor growing into, and sometimes filling, the entire cavity of the decay. These tumors are not necessarily painful; indeed they cause little annoyance except when they are brought in contact with the opposing tooth or a piece of food, when the pain is often mistaken for that of toothache. In the treatment, when the tooth which is the exciting cause of the polypus is not of much importance, its removal is a radical cure, and should be proceeded with at once. There are conditions, however, where it is advisable to use means to save the tooth; as when the decay is in the approximal surfaces of the bicus-

pid or canine teeth; or when there is a sufficient portion of the dentine still sound, in which case the best way to remove the tumor is to insinuate a pledget of cotton wool saturated with white hard spirit varnish, or camphorated spirit, underneath the free edges of the tumor, packing it to a level with the ragged edge of the decay, and applying nitrate of silver to the surface of the gum. In the course of a day or two the tumor will have disappeared, when the tooth may be plugged in the usual way. I have found the above treatment more satisfactory than the use of the lancet, which is sometimes followed by excessive hemorrhage.

CHAPTER XI.

TARTAR.

Tartar or salivary calculus is deposited from the saliva, and is to be found in greater or less quantity in almost every mouth. There is a great diversity of opinion with regard to the source whence it is derived; one class of writers asserting that it is deposited from the mucous, and others that it is from the saliva. That it comes from the salivary and not from the mucous glands, must be recognised, I think, in the fact, that salivary calculus is often found in the ducts of the salivary glands, but not in the ducts of the mucous glands. A medical gentleman in Liverpool had one removed nearly the size of a hen's egg from the right submaxillary gland: and I removed one about the size of a pea from the duct of the sublingual gland of a lady in Edinburgh, who suffered very much from the swelling and pain of which it was the cause. Another evidence in favour of the theory that it comes from the saliva is, that it is always found in the greatest quantity deposited

on those teeth situated in the locality of the mouths of the salivary ducts, as the four incisors of the lower jaw, at the mouth of the sublingual gland, and the first and second molars of the upper jaw, opposite the mouths of the parotid glands. It is described as being of different kinds; as hard, soft, black, etc., varying according to the temperament of the individuals. The chemical constituents of each are pretty much alike, varying only in degree; but as it differs in different individuals, under different constitutional conditions, no two analysis of it are alike. Berzelius found it to contain in 100 parts—

Phosphate of lime and magnesia	79·0
Salivary mucous and salivine	13·5
Animal matter	7·5
	100

I do not think that tartar is in itself a cause of caries. I rather look upon it, as I before stated, as a preventitive, especially the dark hard deposit. I have seen cases where caries seemed to have been arrested by it, and the cavity of decay plugged as it were with a natural plugging. Still, in my opinion, there are more teeth lost by it than there is by caries. It is very hurtful to those teeth upon which it is allowed to accumulate, by creating an irritation of the gums, causing recession thereof, destroying the dental periosteum, absorbing the alveoli, and loosening the teeth; in severe cases raising them out of their sockets.

When the tartar is permitted to accumulate for any length of time, the gums become exceedingly sensitive, the toothbrush is used less frequently, and ultimately discontinued altogether; but the evil goes on increasing daily, until the irritation becomes so great, that the continued discharge of fetid matter from the gums corrupts the fluids of the mouth, and ultimately affects the constitution. The breath, also, becomes exceedingly offensive and nauseous, not only to those persons who are near; but the odour is of such a peculiar permeating nature, that it will contaminate the atmosphere of a room. Chemical analysis gives us the elements of which tartar is composed; and microscopical examination shows that the mouth has both animal and vegetable parasites living within its domain, "and that tartar is composed of infusori worms, and their dead remains, with epithelial cells, remains of food, slime, and secretion of saliva." * Dr. Jules Lemaire, writing on microscopic parasites says, "I am led to believe that the infusoria which have been found in the mucus, have been developed under a state of *uncleanliness*." Surely, with a knowledge of these facts, no one will permit such an offensive deposit to accumulate, when its prevention is so easy, requiring no more attention, or greater calls upon our time, than is necessary to keep the face and hands clean.

TREATMENT.—Having ascertained of what offensive matters tartar is composed, and its baneful

* "The Inhabitants of the Mouth and Teeth."—Schrott.

effects upon the organs of the mouth, and also upon the constitution, I will now proceed to point out the remedy. When tartar has been permitted to accumulate to any great extent, then it can only be removed with instruments adapted for the purpose, an operation which requires to be carefully and thoroughly done, so that no vestige is left behind that would serve as a nucleus for a fresh deposit. If the gums are very tender and vascular, they should be brushed daily, for a week, two or three times a day, with a soft brush charged with some astringent tincture or wash, such as No. 1, before proceeding to remove the tartar. After such treatment the gums are less tender, and the hemorrhage is not so great. When the tartar has been removed, the tincture should be continued for some time, until the gums have regained their elasticity and colour. Acid should never be used to decompose the tartar, as any agent that would act upon it, would also act injuriously upon the teeth.

As it is better to prevent disease when we can, than it is to cure it after its ravages have extended perhaps to the destruction of some of the tissues, all means should be taken to prevent the tartar from depositing upon the teeth at first, which can easily be done by the daily use of the brush. During the day the teeth are to a certain extent cleansed by the action of the tongue, the lips, and the food, in speaking and eating; but at night those organs are at rest, and the tartar is then deposited in greatest quan-

tities. The morning, therefore, is the best time to cleanse the mouth, and in doing so, carry the brush back to the molars, especially the molars of the upper jaw, opposite the ducts of the parotid glands, and also inside the mouth, at the backs of the lower incisors at the duct of the sublingual gland, using the brush not only horizontally, but also upwards and downwards, so as to get between the interstices, that all parts may be clean. If one of the molar teeth has lost its antagonist, the crown of that tooth should be brushed, as the tartar deposits between the cusps, and is not removed by the food as it is from the others. We often hear from our patients, when we hint at the use of a brush, that they are most regular in its use, while we have before us the evidence that they are most regular in abstaining from it. Others again frankly say they cannot be bothered, or have no time to spare. But it occupies no more time to keep the teeth clean than is necessary to wash the hands; and those people who know the pleasure and comfort of a clean mouth, would forego many a personal comfort rather than lose that one. It is told of General Grant, the present President of America, by a gentleman who shared in the Vicksburg campaign, up to the time the enemy crossed the Big Black in the retreat towards Vicksburg, "that in starting on the movement, the General disencumbered himself of everything, setting an example to his officers and men. He took neither a horse nor a servant, overcoat nor blanket, nor tent nor camp

chest, nor even a clean shirt. *His only baggage consisted of a toothbrush.*" He always showed his teeth to the rebels; and his teeth, like his hands, were clean. It is surprising to see some persons who are scrupulously particular about their dress and outward appearance—who would be ashamed to be seen with a dirty face or soiled hands—yet never think of cleaning their teeth; and who, when they open their mouths to speak or laugh, disclose a number of unsightly snags encrusted with a mass of disgusting matter, offensive to the sight, and which emits an odour that keeps friends and foes alike at a respectful distance. As none who have the slightest self-respect would willingly offend in this way the susceptibility of their neighbour, it must arise from unconsciousness, the effect of habit. They do not know how offensive it is, and no one but a professional man dare tell them; and even he would hardly do so face to face.

CHAPTER XII.

ARTIFICIAL TEETH.

The mouth, either at rest, or employed in giving expression to the thoughts and emotions of the mind, contributes largely in revealing the character of the individual. It is the feature which attracts perhaps the largest share of attention. It is called by Isiodorus, an old writer, "the messenger of the soul; for we speak by the mouth that which before we conceive in soul and thought." Its mobility gives an ever varying expression to the face, whether extended in the hearty and exhilarating laugh that springs from a heart at ease and is only enjoyed by the honest and true, slightly parted in expectation, firmly set in anger or determination, or expanding in the sweet smile of love and affection: in all those changes the teeth are essentially necessary to give expression and harmony to the whole. Without the support of the teeth, the lips contract and fall in, so that the integrity of the one cannot be de-

stroyed without affecting the beauty and usefulness of the other. Full and expressive lips, clean and regular teeth, with roseate healthy gums, go far to redeem an otherwise indifferent face.

When the natural teeth have been lost, or destroyed by accident or disease, it is of the utmost importance, in repairing the loss by artificial substitutes, that the contour and expression of the face should be maintained, so that the change may be as little noticeable as possible; and to do so it is necessary sometimes to make up for loss that has been sustained by the alveolar ridge, either from absorption or exfoliation, so as to restore again the play of the facial muscles, so important to the appearance.

No two sets of natural teeth are alike. There is as much diversity in the teeth as in any other feature: and teeth that look well in one mouth would be quite out of character in that of another. Their beauty consists in their harmony with the other features of the face. In adapting artificial teeth to the mouth, the natural organs should be imitated as closely as possible; not only with reference to size, but the complexion of the teeth with reference to temperament should also be considered. There is the nervous, the sanguine, the lymphatic, and the bilious temperament; and in each the teeth have their assigned position and complexion. The nervous and lymphatic range in shade from chalk to a blue, the bilious from light yellow to dark brown, the sanguine from the pearl to the cream colour of

strong, dense, healthy teeth. A set of teeth that would look well in the mouth of an individual of a bilious temperament would be quite out of harmony with the features and complexion of an individual of a lymphatic temperament. A proper choice of colour is requisite in obtaining a pleasing and satisfactory result. No set of teeth can be perfect without harmony of colour and complexion.

There are other considerations of importance in arranging and constructing a set of artificial teeth, such as the length of the lips, the size of the tongue, the relative size of the upper and lower arches, the amount of absorption of the alveolar ridges, the connections of the muscles of the cheek, etc. By a little closer attention to those particulars, artificial teeth would not seem so artificial as they too frequently do. But unfortunately the individual who makes the denture is generally only a mechanic, and knows nothing of the anatomy of the mouth; and although he did, he seldom sees the patient for whom the work is intended. It is no wonder, then, there are so many artificial dentures that, instead of adding to the personal appearance, are a positive disfigurement—uncomfortable to the wearer and offensive to the beholder.

When should recourse be had to artificial teeth? With the exception of the *dents sapientia*, no other tooth can be taken away without destroying the integrity of the others. In a well formed arch the teeth naturally support and protect one another;

and when an intermediate tooth is taken away, that support is lost, and the teeth begin to separate and change their positions. Considerable mischief occurs in delaying too long to have recourse to artificial substitutes to replace natural teeth that have been lost, either by extraction, or that have decayed down to the roots. The lips and cheek contract upon the oral cavity, and the tongue increases so much in size, as to lessen the space necessary for the comfortable endurance of an artificial denture; and the habit acquired in trying to hide the deficiency by drawing the lips together, when they should expand as in laughter, gives a sinister twist to the features, that is anything but pleasing. There is another evil in too long delaying. The teeth not only support one another laterally, but the molar and bicuspid teeth support one another, by what may be called antagonistic pressure; and when those teeth lose their antagonists, that antagonistic pressure being gone, they protrude into the unoccupied spaces, becoming loose in their sockets, and in consequence of their increased length, the teeth in the artificial denture have to be made shorter, to allow the mouth to close: whereas, had recourse to artificial teeth been had in time, the teeth would have been their natural length, and the opposing jaw would not have suffered.

There is a period beyond which the assistance of artificial substitutes to replace teeth that have been lost, cannot be delayed without serious mischief

ensuing; that is, when the occlusion of the antagonistic molars is transferred to the anterior teeth. The molar teeth have diverging roots, and are well adapted to resist the direct pressure that is brought to bear upon them during the process of mastication; and the concussion, instead of being injurious to them, is necessary and beneficial: for we find that when it is removed, they get loose in their sockets, inflammation ensues, and they ultimately become so tender that they have to be extracted. On the other hand, the incisor and canine tooth have only one root, and are not adapted to resist continued pressure or concussion. The action of the incisor teeth is similar to that of a pair of scissors, and is intended for cutting the food into small pieces, preparatory to its being put under the molars, or mills; and when the posterior pressure and concussion consequent upon the loss of the molar teeth falls upon them, inflammation of the periosteum and alveoli takes place; and unless the pressure is transferred to artificial substitutes for the molar teeth, the incisor and canine teeth will soon go, and the lower jaw comes so far forward as quite to alter the expression of the face.

There is another period beyond which it is even dangerous to delay having recourse to artificial teeth to supply the loss of natural ones, that is when the impaired digestion gives notice that the preliminary process of mastication is defective. One of the principal uses of the teeth is for the pro-

per mastication of the food, and great injury results when the deficiency of the teeth is such as to interfere with it. I believe that many a life has been cut off that might have been prolonged, by a timely application of properly constructed artificial teeth; and I believe there is not an instance in which the perfect uses of the teeth may not be restored, if taken in time; but delay in that as in other things is dangerous. In every case of failing health, when the symptoms indicate defective nutrition, or indigestion, the condition of the masticatory organs should demand our first attention; and if these are deficient the cause is not far to seek.

Indigestion is frequently caused, and is always aggravated by imperfect mastication. The food (especially vegetable food) requires to be thoroughly mixed and impregnated with the saliva, to prepare it for the process of digestion; and the operation of mastication excites the salivary glands, which are so situated that the action of the cheeks and tongue in turning over and transferring the food from side to side during the process of mastication, stimulates them to an increased secretion; and the more thoroughly the morsel is masticated, the more it becomes impregnated with the saliva, and is the better prepared for deglutition and digestion. As life advances, the system requires that the digestive organs should be able to extract the greatest amount of nourishment from the food that is conveyed into the stomach, and to that end, it is imperative that the

apparatus for bruising and comminuting the food, with a due admixture of the saliva, be in a sound condition, to prepare it for being easily transformed into chyle and blood, that the various tissues of which the body is composed may be nourished and supported. Chemically, good food properly digested, has all the necessary elements for elaborating pure blood, which supplies all the material to construct perfect tissues; and perfect tissues constitute the perfect organization of the being. When the natural teeth are gone, especially the molars, it is of the greatest importance to the preservation of health, that their work should not be left undone, but that the most efficient substitutes should be got to supply their place. I am the more particular in urging the restoration of the functions of the lost molar teeth, as they exercise a great influence upon the digestion, and consequent health of the individual; whereas, the loss of one or more of the front teeth may be sustained, without doing more harm than affecting the articulation and personal appearance; and most people are sufficiently desirous to maintain that, to require no other incentive to seek their restoration. But the molars not being observed, though of greater importance, are seldom sought to be restored, until their loss is seriously felt, by the disorganisation of the system.

CHAPTER XIII.

THE INFLUENCE OF DIET UPON THE TEETH.

It is a fact admitted by all physiologists, that the growth of the animal is affected by the quality and quantity of food upon which it is nourished,—that an insufficient supply or defective quality, will retard the growth, producing a small and sickly animal which, under more favourable conditions of food, would have developed into a large and healthy one. “Warren Hastings attributed his smallness of stature to the hard scanty fare of a school at Newington, where he was well taught but ill fed.” In order to secure the healthy and perfect development of the child, it is necessary that the mother during the period of lactation should be sufficiently supplied with food that is rich in the materials requisite not only to supply the waste in her own system, but also to meet the requirements for the perfect development of the growing child. The want of that

proper food to the mother, and the consequent improper feeding of the child, is a prolific cause of the imperfect development of the teeth, and their subsequent susceptibility to decay.

It is interesting and of importance to ascertain how the development of any special tissue is affected by diet, or if diet has any influence at all in that direction. Chossat demonstrated by actual experiment, that in animals restricted to food containing little or no phosphate of lime, the bones become soft. And as an illustration of the necessity of inorganic material, Professor Mulder quotes a case, "where a family in which the children suffered repeatedly from fractures of the bones, the cause was traced to an insufficient supply of the phosphate of lime, afforded by a low potato diet. Its change to a regimen of meat and rye-bread, by restoring perfect nutrition, removed the disease." It is necessary then, to the development of the hard osseous tissue, that phosphate of lime should be an element in our food, as the strength and solidity of the bones and the teeth is due to the presence of that salt in their structure. By referring to the analysis of the enamel, dentine, and cementum, in chap. iv., it will be seen that the phosphate of lime is the principal constituent of those substances. Being so essential then to their composition, it is important that a sufficient supply of it should be introduced into the system to build up those bone structures, the strength and solidity of which is of so much

consequence to the health and wellbeing of the individual. When the supply is insufficient the bones are soft and pliant, and the teeth are imperfectly developed. It is in the early period of the child's growth that the greatest portion of the bony substance is deposited, and the substance of the teeth is deposited in the tooth cells of gelatinous tissue. It is then that parents should give the subject of their children's diet their best attention,—to see that it is such as contains a sufficient supply of the phosphate of lime, or bone earth, as it is called, to meet the requirements of the teeth and bones, in the early period of their development and growth.

It is wisely ordained by the beneficent Creator, that so long as the child is dependent upon the mother for its nourishment, a food is provided in the mother's milk, containing within itself all the elements that are necessary for the formation and growth of the teeth, bones, and other tissues that go to make the perfect individual, besides evolving the necessary amount of heat for its comfort and preservation; but that it may do so, it is necessary that the mother be in good health, and be sufficiently supplied with nourishing food, that the blood deriving those necessary elements from the food may in turn be able to supply it to the milk, from which it is secreted.

From the following analysis of healthy woman's milk, we find in its composition all those elements requisite for the formation of bones, teeth, and the

other constituents necessary for the life and growth of the individual :

Woman's Milk, by Simon :

Water	.	.	.	.	.	883.6
Butter	.	.	.	.	.	25.3
Caseine	.	.	.	.	.	34.3
Milk sugar, and extractive matter	.					48.2
Fixed salts	.	.	.	.	.	2.3
						1000

And in that of the cow's

Cow's Milk, by M. Haidlen :

Water	.	.	.	.	.	873.00
Butter	.	.	.	.	.	30.00
Caseine	.	.	.	.	.	48.20
Milk sugar	.	.	.	.	.	43.90
• Phosphate of lime	.	.	.	.	.	2.31
Phosphate of magnesia	.	.	.	.	.	.42
Phosphate of iron	.	.	.	.	.	.07
Chloride of potassium	.	.	.	.	.	1.44
Chloride of sodium	.	.	.	.	.	.24
Soda in connection with caseine	.					.42
						1000

we have, with a little alteration, a substitute that may take its place without much loss. The cow's milk differs from that of the woman in so far as it abounds in butter, and particularly in caseine, or cheese; and woman's milk has more of the saccharine

principle, or sugar of milk. Chemical analysis, by giving us the constituent parts of both, enables us to a large extent to rectify that of the cow, and produce a milk having many of the properties, and nearly analagous to that of the woman. By diluting it with water in the proportion of half a pint of water which has been boiled, to a pint of milk, that will reduce the cheese principle to the right proportion, add a small quantity of cream to supply the proportion of butter; then add sugar until the whole is distinctly sweetened, and we have a compound which, in cases of emergency, may take the place of that derived from the human breast. The analysis of the milk when healthy, shows that it contains butter, cheese, and sugar. We now see how the infant can thrive so well upon it. The cheese, or caseine, contains the nutrient principle which, together with the earths and salts contained in the milk, goes to form bone, muscles, and different tissues of the body; the sugar, which contains a large quantity of carbon in its composition, goes to supply the heat that keeps up the temperature of the body; while the butter in the nature of fat gives roundness and plumpness to the infant. So long as the child is thus nourished it is safe, and the foundation of a robust frame is laid.

From the period when the child is no longer dependent upon the mother for nourishment, and requires that other food should be provided for its sustenance, it is of the highest importance that the

food which is to take the place of the mother's milk, should be such as supplies the necessary elements required for the continued growth, and continued deposition of organic and earthy particles necessary for the formation of bone, teeth, flesh, and every part of the human body. It is possible to give a child plenty of food and at the same time starve it, if the food does not contain those elements which are necessary for the formation of certain tissues. Dr Richardson says, "The error of diet, which leads to disease manifestation, consists chiefly in the use of foods in which the earthy and the nitrogenous elements are deficient. Such foods, for instance, as rice, arrow-root, gruels, and messes made out of dried husks of bread; upon these foods the infant starves, and the teeth, for the support of which materials so entirely different are required, starve most." In further speaking of the influence of food on the primary stages of teething, he says, "The effects of foods and drinks on the dental organs act differently at different periods of life. In the first days of infancy the effects of food must of necessity act solely through the system; and when we remember the simple truth, that in their primary stages the teeth are composed of soft and exceedingly vascular structure, that they are modifications of mucous membrane, and that their osseous structure is built out of matter the nutrition of which is long active, and easily perverted, we have no difficulty in seeing that

the supply of innutritious food must be a leading constitutional cause of imperfect dental development. In many instances the child is submitted to a dietary that contains only one of the necessary elements for forming bone tissue, and the result is a depraved nutrition generally, and an especial deprivation of the necessary elements for the dental structures. A consequent result of such injudicious diet is, that the permanent teeth are delicately formed, and in after life, with the enamel imperfect, and the dentine imperfect, they are susceptible to external agencies which on firmly built organs would exert no influence whatever."

Having seen how during the process of development the growing child requires that certain elements which are necessary for the nutrition of the osseous and tooth structure (with which we are more immediately concerned), should be contained in the food upon which it is nourished, we will now proceed to show how that is to be obtained. Although the mysterious process is unknown, by which Providence has appointed, that each several tissue, whether it be the hard enamel of the tooth structure, or the soft but highly organized mass of brain or nerve, extracts from the blood, the necessary elements which each requires for its own formation and growth, still it is well known that unless all the elements which are necessary be contained in the food, they will not be found in the blood, and whichever tissue is starved must suffer in consequence. It seems as

though the All-wise Creator designed that man should use the reason with which he has been endowed in the selection of articles proper for his food. The inferior animals, guided by unerring instinct, select at once the kind of food required for their sustenance, and which nature has destined for their use, to which they adhere through life, and never seek to change; with them appetite is an instinct, but with man it is an impulse, to be guided by reason and reflection, in selecting from nature's bounteous storehouse that which is best suited to his requirements.

There are two great principles required of food, "one to nourish and the other to give heat to the body; and food when consumed is applied to one or other of these purposes." In the process of digestion, the constituents of the food are separated and arranged into three classes:

1st, All that portion derived from animal food, eggs, the curd of milk, the gluten or adhesive portion of wheat and other grain, and whatever of animal or vegetable food can be rendered into albumen—of which the best example that can be offered is the white of egg, which is in reality nearly pure albumen; and the principle is therefore called *albuminous*.

2nd, All that portion of food derived from vegetables, starch, sugar, &c., or that can be converted into sugar in the process of digestion. This principle is therefore called *saccharine*.

3rd, All the fat, butter, oil &c. which, when deprived of the other substances, is left in the state of *oil*, and therefore called *oleaginous*.

Now, of these three, the albuminous is the nutrient, and the saccharine and oleaginous the calorific or heat-giving. Without attempting to dictate upon what food a child should be fed, it is sufficient to state, that in order to develop bone and muscle, and to secure the healthy organism of the tooth structure, the diet should consist of aliment having 1st, The heat-giving principle, which is contained in the usual food, such as milk, wheaten bread, potatoes, Indian corn, arrow-root, and in most vegetable matter and sugar. 2nd, The nutrient principle; and this is contained in albuminous aliments, such as eggs of all kinds, milk, the lean of beast, bird and fish, especially oysters, wheat, rye and potatoes. Dr R. D. Thomson found by analysis that

	PER CENT.			
Bean meal contains of albuminous matter				25.36
Scotch oatmeal	„	„	„	23.62
Semolina	„	„	„	15.61
Flour	„	„	„	11.70
Barley	„	„	„	11.31
Maize	„	„	„	10.93
Sago	„	„	„	3.33
South Sea arrow-root		„	„	3.21
Potatoes		„	„	2.23

3rd, Containing the inorganic or earthy constituents,

from which the bones and teeth are formed, and these are to be found in "milk, eggs, animal food, and particularly in wheat, rye, oats, potatoes &c."

In Carpenter's Physiology, he says, "These substances are contained more or less abundantly in most articles generally used as food, and where they are deficient the animal suffers in consequence, if they are not supplied in any other way. Thus common salt exists, in an inconsiderable quantity, in the flesh and fluids of animals, in milk, and in eggs; it is not so abundant, however, in plants, and the deficiency is usually supplied to herbivorous animals by some other means. *Phosphorus* exists also in white and yolk of egg, and in milk; and it abounds not only in many animal substances used as food, but also (in the state of phosphate of lime or bone earth) in the seeds of many plants, especially the *grasses*. In smaller quantities, it is found in the ashes of almost every plant. *Sulphur* is derived alike from animal and vegetable substances. It exists in flesh, eggs, and milk, also in the azotized compounds of plants, and (in the form of sulphate of lime), in most of the river and spring water that we drink. *Iron* is found in the yolk of egg, and in milk, as well as in animal flesh; it also exists in small quantities in most vegetable substances used as food by man,—such as potatoes, cabbage, peas &c. *Lime* is one of the most universally diffused of all mineral bodies, for there are few animal or vegetable bodies in which it does not

exist. It is most commonly taken in, among the higher animals, combined with phosphoric acid: in this state it exists largely in the seeds of most grasses, and especially in wheat flour. If it were not for their deficiency of *lime*, some of the leguminous seeds (peas) would be more nutritious than wheaten flour—the proportion of azotized matter they contain being greater. A considerable quantity of lime exists in the state of carbonate and sulphate in all hard water.”

As the salts necessary for the formation of bone and tooth structure are contained principally in the husks of the wheat, it is desirable that all the bran should not be taken away from the flour; as doing so deprives it of one of its most valuable constituents as an article of food; but instead of retaining any portion of the bran, it is the chief aim of the millers of the present day to get rid of it entirely, and this is looked upon as the perfection of milling. There is no doubt that it does make the flour look whiter, but there is as little doubt that it is at the expense of the nutrient quality of the flour, deteriorating its value as an article of food. Professor Johnston, on “examining wheat and flour as to the amount of nutrient or muscular matter, the fat forming principle, and the bone and saline material contained in grain,” found the difference to be very considerable, as the following table of analysis will show:

	MUSCULAR MATTER	FAT PRINCIPLE	BONES AND SALINE
In 1000 lbs. of whole grain	156 lbs.	25 lbs.	170 lbs.
„ „ of fine flour	130 „	20 „	60 „
„ „ bran		60 „	700 „

Quoting again from the same author, he says, “Accordingly the whole grain is *one half more nutritious* than fine flour.” He also shows the proportion of *bone material* that is contained in the bran—somewhat more than two-thirds of the whole, “and how large a quantity of the bone material would be added if unbolted flour was used instead of fine flour.” As an illustration of the importance of this bone forming, and bone sustaining material being retained, I would instance the effect of oatmeal as an article of diet. It is well known that oatmeal contains the bran or inorganic constituents of the grain, and is therefore better qualified as food for children than wheaten flour. Oatmeal and milk is capable of sustaining man in health and strength even when exposed to the vicissitudes of the weather in our variable climate, and employed in continuous hard work out of doors. In the agricultural districts of Stirling, Perth, Forfar, and Kincardine, the male farm servants are lodged in what is called “the bothy.” They live by themselves, and have not much time, and perhaps as little inclination, to cultivate the refinements of life. Their habits are very primitive, and not having much time to study the art of cooking, and being deficient in the mate-

rials with which to practise it, their food consists chiefly of oatmeal and milk. In Perthshire they breakfast and sup on porridge and milk, and dine at mid-day on brose. In Aberdeenshire porridge is not so common—"brose," that is oatmeal simply scalded with boiling water, being substituted. It is made very thick, so much so that south country men will hardly use it: it is generally taken with sour milk. Though living on a diet confined chiefly to oatmeal, they are a strong hardy class of men, having plenty of bone and muscle, and capable of enduring much fatigue. Now, contrast their condition with that of men confined to a diet of Indian corn flour, which contains but a small portion of inorganic matter. I quote from Dr Paul of Trenton, N.J. "As an example or illustration of the want of the nutrient principle in Indian corn meal, I may here allude to the effects I have seen in the West Indies, where, in a dearth of the ordinary provisions on which prisoners are fed, corn-meal was substituted—corn-meal and salted herrings, fish, &c. constituting their food. Now, the effect was, that all the prisoners lost their natural strength; at the same time they became fat and bloated, inclining to dropsy: and this was not the effect of incarceration, for the prisoners were engaged in road-making, trimming fences, &c., consequently in a healthy exhilarating employment." *

Although Indian corn flour contains little of the phosphate of lime or bone earth, it is not to be despised as an article of diet. Containing as it does a large proportion of starch and fatty matter, it is valuable as a light diet

In conclusion I would remark, that in the early periods of life, while the frame work of the body is being built up, diet is of great importance as influencing the supply of material necessary for that process. Unless the elements wherewith to lay a good foundation are there, the superstructure will be weak, and the ultimate health and strength of the individual will suffer in consequence. It is therefore of the utmost importance that parents should give their best attention to the quality of the food supplied to their children,—to see that it contains those elements requisite to meet the requirements of the various tissues that go to make up the perfect individual, the imperfect development of any one of which is sure to entail suffering upon the child. We have seen that it is possible to supply the child with food that appears to satisfy it, and upon which it may grow fat, and yet certain tissues (as the teeth) may absolutely starve, if it contains nothing from which they can extract nourishment. It is always a critical period in the management of infants, when the maternal food is being changed for that which is to take the place of the mother's milk, and it is at that period the teeth suffer most, as the place of the nitrogenous, fatty and saline food, is too often supplied by a dietary in which only one of these elements is present in sufficient supply to

for fattening and heat sustaining purposes. It is generally prepared with eggs and milk, and is a desirable adjunct to other food which contains a larger proportion of earthy constituents.

meet the requirements of the system. Dr Andrew Combe* says, "There is no period of life during which it is of greater importance to conform to the intentions of nature in the regulation of diet, both as to quality and quantity, than during the earliest part of childhood, for at no period is the neglect of them more fatal. Surprise is sometimes expressed at the number of children who are carried off before completing their first or second year, but when we consider the defective education, and entire ignorance of the human economy not only of the nurses and servants to whose care the young are entrusted, but of the parents themselves, our wonder ought to be not that so many die, but that so many survive. There is perhaps not one mother in ten thousand, who, before becoming such, has ever enquired into the nature and wants of the newly born infant, or knows on what principles its treatment ought to be directed; and hence the hurtful and superstitious notions concerning the human economy which still linger in the nursery long after they have ceased to prevail in the world of science."

In the matter of diet professional aid can avail but little. All that the professional man can do is to indicate general principles, and leave it to the intelligence of the parents themselves to adopt the particular food best suited to the requirements of the case. Where there has been a deficiency of the

* "Physiology of Digestion considered with relation to the Principles of Dietetics."

earthy compounds—as there must be in a diet confined to such foods as superfine flour, Indian corn flour, rice, arrow root, sago, &c.—let there be substituted bran bread, oatmeal, milk, eggs, lean of meat, &c., out of which the teeth and bones will be able to extract those elements necessary for their growth and subsequent health and usefulness.

CHAPTER XIV.

ANÆSTHESIA.

The principle of anæsthetics, or painless surgical operations, is so closely connected with dental surgery, that any work on dentistry would be incomplete without some reference to it; especially as it is to a dentist that the world is indebted for the modern and practical application of narcotics as a means of performing surgical operations without pain. Anæsthesia, whether local or general, has been a valuable agent in the hands of the dentist, to mitigate or assuage the suffering incidental to the various operations he has to perform in the course of practice; and although none of those operations are capital, that is, involving life, still some of them are accompanied with severe pain, and any safe means that will deprive them of that terror, must be considered as a great boon to mankind. But in those more important and serious operations that belong to the province of the general surgeon, it is indeed a blessing.

There is no doubt that the ancient physicians possessed a knowledge of narcotic agents capable of producing an insensibility to pain, amongst which was the juice of the leaves of the mandragora, * which is said by Pliny and Dioscorides to be more potent than the preparation made from the root. It was administered by smelling, or inhalation. Apuleius also states that any one about to have a limb mutilated, burnt, or sawn, (a pleasant prospect, surely), may drink half a pint of the wine mandragora, and whilst he sleeps the limb may be cut off without pain; its anæsthetic influence was therefore known, whether administered as a narcotic draught, or by inhalation. About the same early period, Indian hemp was used by the Chinese to deaden pain in operations. More than a hundred years ago, the mephitic vapour of the Grotto del Cane, near Naples, was known to possess anæsthetic properties, and the guides were in the practice of putting dogs into the cave for a short time, to exhibit to visitors the effect of the vapour upon them; when they came out, they were insensible to pain, in which state they continued till revived again by the air.

In the seventeenth century anæsthesia was produced by narcotic draughts. Dr Snow relates an anecdote of how an operation was performed by

* The mandrake. It was used as an ingredient in love philters, etc. One of the titles of Venus was, Mandrake Venus. Its narcotic influence was well known to the ancients. It was a common saying of a sleepy or indolent man, that he had eaten mandrake.

Weiss, upon Augustus, King of Poland and Elector of Saxony, who suffered from a wound in his foot which threatened to mortify. "The court medical men were opposed to the operation of amputation, but during sleep, induced by a certain potion surreptitiously administered, his favourite surgeon, Weiss, cut off the decaying parts. The royal patient was disturbed by the proceedings, and enquired what was being done; but on receiving a soothing answer, he again fell asleep, and did not discover till the following morning, after the usual examination, that the operation of amputation had really been performed." In the beginning of the present century, in the year 1800, Sir Humphrey Davy suggested that "as nitrous oxide gas, in its extended operation, appears capable of destroying pain, it may probably be used with advantage during operations in which no great effusion of blood takes place." It is surely very remarkable, that the hint here suggested by Sir Humphrey Davy, should have lain so long as forty-four years, without any practical result being obtained. It is to a member of the dental profession that the world is indebted for the use of a narcotic in modern surgical operations.

In 1848 the late Mr Horace Wells, dentist, Hartford, Connecticut, having been present at a lecture delivered at Hartford, by Dr G. Q. Colton, on the properties of the nitrous oxide gas, or as it was then popularly called the "laughing gas," was so impressed with the idea that any person under its in-

fluence would have immunity from pain, that he resolved to test the truth of that idea in his own person, and had the courage to submit himself to be put under the influence of the gas, which was administered by Dr Colton; and while under its influence, a professional friend extracted a large molar tooth from his mouth, without causing him any pain. When he recovered consciousness he might have exclaimed, like Archimedes of old, "Eureka!" for he certainly had found that which has proved a great boon to his fellow men. He suffered a common fate, with many others who have made discoveries by which mankind have benefited, and was treated with incredulity and neglect. Still, his name must ever be associated with those who are benefactors of their race, and be remembered with everlasting gratitude by those who have to submit to the tender mercies of the surgeon's knife and saw, for he has robbed these of more than half their terrors. The operation was performed on the 11th December, 1844, and was the first painless operation accomplished in modern times, after insensibility had been produced by inhaling a narcotic. Since that time the attention of professional men has been directed towards obtaining an anæsthetic with the minimum amount of risk. There have been many agents used for that purpose, some whose action was local, and others (the majority) acting generally, that is by producing insensibility over the whole system. The vapour of ether was administered by inhalation in

1846, by Dr Morton, dentist, Boston, who at one time had been in partnership with Mr Wells; and in December of the same year, Mr Robinson, dentist, London, extracted a tooth for a lady while under the influence of the vapour of ether, which was the first operation performed in Britain while the patient was under the influence of a narcotic.

In the latter end of 1847 Dr (now Sir J. Y.) Simpson successfully employed chloroform for producing anæsthesia; and in November of that year he published a paper describing the specific effect of the narcotic. Since that period a great variety of narcotics have been tried by various experimentalists, and amongst the number no one has been more successful than Dr Richardson, to whom the profession is much indebted for his instructive lectures on subjects relating to dentistry, in one of which he states, "In 1853 I made the observation that the fumes arising when the lycoperdon giganteum or common puff ball is exposed to heat, produce on inhalation a very perfect anæsthesia. The fumes of this fungus have indeed been applied for a narcotic purpose from the earliest days in the history of this country, for stupifying bees before robbing the hive of the honey contained in it. The custom in many parts of the country has been to cover up the hive, place a piece of burning fungus beneath it, allow the smoke to pervade the hive for a few minutes, then to raise the hive, shake out the occupants, which are rendered by this process insensible,

remove the sweet treasure, and return the sleeping insects back to their homes. In a little time they return to consciousness, and, fed during the winter, are ready to resume their busy work with the returning flower season. It was the simple story of this mode of narcotizing bees that led me to experiment with the lycoperdon. I soon found that I had a most valuable narcotic, possessing all the narcotic properties of chloroform, without many of its risks." But difficulties in the mode of administering it to patients prevented it from coming into use.

Proceeding in chronological order, in 1854 pounded ice and salt was used in Paris as a local anæsthetic, for minor and superficial operations, such as removing fatty tumors etc., with perfect success,—the extreme cold producing temporary annihilation of local sensation. Mr Blundell, a dentist in London, endeavoured to apply the principle to relieve the pain in the extraction of teeth; and for that purpose sought the scientific aid of Messrs Horn and Thornthwaite, philosophical instrument makers, London, to construct an apparatus capable of applying extreme cold to the teeth and gums, in which they were successful; but difficulties in its application, and its being a patent, prevented it from coming into general use. I bought the patent right, and used it in my practice with a fair amount of success. In the removal of stumps, or upper teeth, there was, in almost every instance, perfect immunity from pain. I have extracted as many as fourteen stumps from

a patient at one sitting, using Thornthwaite's apparatus for congelation, without the slightest pain or inconvenience resulting to the patient; but unfortunately the results were not equal, some constitutions resisting the influence of the cold more than others. To the plethoric and full blooded, it was seldom a perfect success, although to a large degree it mitigated the amount of pain. I cannot go the length of some of the advocates for congelation by that apparatus, and say that it is an instrument to meet the requirements of every case; nor do I condemn it as unqualifiedly as some others, who drew frightful pictures of sloughing and gangrene, that was to be the sure result of arrested circulation. I have used it in a great many operations in the mouth, and never had any bad results from it; but in the great majority of them, it fulfilled all the requirements of a local anæsthetic.

In 1857 Dr Snow used amyline as a general anæsthetic; and in the beginning of 1858, electricity was used as a local anæsthetic. It was first used for that purpose in America, by Dr Oliver, dentist, Buffalo; and the principle was patented by him on the 16th March 1858. Electricity does not possess anæsthetic properties of any importance. The conclusion arrived at by several of the committees appointed to investigate the question was, that it had none. It produced a diversion of sensation, and confusion of ideas, that puzzled the patient to say where the pain was—in the tooth, or in the arm; conse-

quently the evidence of the patients was so conflicting, that it was difficult to arrive at a true knowledge of the facts. In my own practice the majority said they felt no pain, though all made wry faces; and others said that it was an aggravation of the pain. I discontinued its use in consequence of an incident that occurred in practice. I was very sceptical of its virtue, and determined to test it the first opportunity. A lady, a patient, called one day and requested that I would visit at her house and extract (using the electricity) a tooth for a lady that was staying with her. Having sent my galvanic battery before me, I called and extracted a large molar tooth, much to the delight of the patient, as she affirmed it gave her no pain: in fact, so delighted was she, that she engaged to call upon me that afternoon and have two stumps extracted, though they were not annoying her at that time. Now, I thought, is my opportunity. When she called I extracted the stumps with the aid of electricity, as she thought; but, before operating, I disconnected the forceps from the chain, and there was no more electricity in connection with those stumps than there is in the pen with which I write this. Yet she insisted that she felt no pain, though I tried to persuade her that there was a little. So much for the force of imagination. There was no diversion of sensation in that case. It was the last operation I ever performed with the galvanic battery as an adjunct.

There are a great variety of agents that may be

used for producing anæsthesia. Dr Richardson mentions a number, amongst which will be found, acetic ether, which possesses considerable anæsthetic properties, but is not well adapted for practice;—Dutch liquid, which has considerable anæsthetic properties, and in the opinion of Mr Nunnerly is as good as chloroform;—chloride of olifiant gas, which was used by Nunnerly in 1865, but the difficulty and cost of manufacture is too great for general use;—coal gas, also described by Nunnerly “as a powerful anæsthetic; and when pure, a safe and manageable one;” which opinion is corroborated by Dr Richardson, who says, “I can repeat, from experiment, the correctness of this observation.” In 1865 Dr Richardson used ether spray as a local anæsthetic, applied according to an ingenious method adopted by him, and not patented, but freely given for the benefit of all. It has superseded the more costly apparatus of Thornthwaite. They both obtain anæsthesia by the same agent (cold), but differ in the mode of producing it. In the one case it is induced by a cold fluid (pounded ice dissolved in salt) passing through a flexible tube over the parts to be anæsthetized: in the other, ether, which boils at 92° Fahr., is propelled in a state of fine subdivision or spray, produced by forcing the ether through a fine tube, by means of air produced by hand bellows, and directing the ether upon the part to be operated upon. The rapid evaporation of the ether quickly reduces the temperature, and the blood is

expelled from the surrounding tissues; the part for the time, is dead, and as insensible to feeling as in death. When the cold is withdrawn the blood returns, and vitality is restored, without producing any bad effects.

Within these few years there seems to be a disposition on the part of members of the dental profession to return to the use of the nitrous oxide gas, first used by Wells in 1844. Its action is now better known, and in the manufacture more care is taken to have it pure, and free from nitrous, or nitric acid. Amongst the advantages claimed for it is "the rapidity with which anæsthesia is induced, and the speedy revival of the patient without depression or nausea." Its advocates claim for it also a greater freedom from danger than with any other general anæsthetic. The strongest evidence in its favour is from America, where several capital operations have been performed with success, while the patient was under its influence. "It has been stated that 200,000 known painless dental operations have been performed with it." But it has not made much progress in England. There is danger, no doubt, in its use, if carried too far, as there is with all the narcotics which have been mentioned; and I think, for the majority of dental operations, local anæsthesia is the best: for while it gives relief in almost every instance, it is quite free from danger.

I cannot conclude this subject without referring to another agent that has been long known and fre-

quently used, but not recognised by the majority of the legitimate members of the medical profession; I allude to mesmerism.

That the influence of animal magnetism was known and practised in Egypt from the earliest times seems probable, as the process of mesmerism is delineated upon the walls of the tombs. That it was known to the natives of India is now fully recognised; and in that mysterious influence is to be found a key to the solution of many of their juggling tricks.

The term mesmerism is derived from Mesmer, a doctor of medicine of the university of Vienna, who obtained his degree about 1766, and in 1770 published his views upon animal magnetism, which he affected to believe was a discovery of his own. That Mesmer was a charlatan, and saw his patients in a cabalistic dress, and otherwise humbugged them, does not affect the truth of the principle. It is not my intention to treat of mesmerism, further than as an agent whereby operations may be performed without pain; and that it may be applied for that purpose with satisfactory results, I think there can be no doubt, from the amount of evidence that can be brought to prove the fact. In 1843 Dr Eliotson, a name of European fame, published a pamphlet of "Numerous Cases of Surgical Operations without Pain, in the Mesmeric State." In 1841 Mr Martin, a dentist of Portsmouth, extracted two teeth from a young lady when in the mesmeric sleep, without pain, or any symptom of suffering; and Mr Prideaux,

of Southampton, extracted eleven teeth, and eleven stumps, without pain, the "patient sitting with her hands quietly folded in her lap: the countenance was placid and serene, and the whole attitude that of repose." But there is no need to quote a number of cases; I will only give one more, reported by Mr Purland, dentist, London, who was present at the Mesmeric Infirmary, at the invitation of Dr Eliotson, during the operation of removing the right breast of a female, for cancer, while in the mesmeric sleep. "Having mesmerised the patient, Mr Tubbs proceeded to operate, and dissected out the breast leisurely. He probed with his finger every portion, and finding that a part of the tumor had eluded the knife, he seized it and cut it out, as coolly as if operating upon a dead body. After the wound had been dressed, and the patient's dress arranged, Mr Tubbs awakened her with a few transverse passes," when she declared that she felt no pain, and would not believe that the operation had been performed. During the whole time of the operation she slept with a smile upon her face. That persons under the influence of the mesmeric sleep can undergo serious operations without pain is a fact, as the numerous reported cases in the "Zoist," and the reports of the mesmeric infirmaries, testify; unfortunately it has so often been employed by the charlatan for mercenary purposes, that it is now looked upon with suspicion, and has made no progress with the legitimate members of the medical profession.

CHAPTER XV.

DENTIFRICE.

A work on the teeth, intended for the general reader, would be incomplete without a formula for a good dentifrice. Caries of the teeth being (as I mentioned in chapter v.) in almost every case caused by external agents, it is the duty of the dentist to endeavour to counteract their evil effects; and the daily use of a proper dentifrice is one of the best and simplest means to keep the mouth and dental apparatus in a healthy condition. The word dentifrice is derived from *dent*, a tooth, and *frico*, to rub; and signifies something with which to rub the teeth. A good dentifrice should be capable of keeping the teeth thoroughly clean without acting injuriously upon the enamel by chemical action: nor should it contain any ingredient the mechanical action of which would tend to abrade the enamel, as several of the earths and boles so much used in the old formulas do; but it should have sufficient friction to remove any soft secretion of tartar, or other deposit, from the teeth, and should also be adapted to induce a healthy condition of the gums.

Charcoal is particularly objectionable as a dentifrice. Its action is purely mechanical—friction, and being very sharp and hard, its continued use wears away the enamel. It is insoluble by the fluids of mouth, and lodges between the necks of the teeth and the gums, producing recession of the gums, exposing the cementum, and causing the final loss of the teeth. In the chapter upon tartar I mentioned that microscopical examination shewed that the mouth contained several parasites.* The microscope also reveals the fact, that soap is the most effectual agent in destroying those infusoriæ, which yield to it, but resist the influence of spirits, tobacco juice or smoke, and other agents. No dentifrice, therefore, is complete that does not contain soap as one of the ingredients. Used by itself soap is not of much value: it acts as a lubricant, and wants the necessary friction, which must be added in the form of some powder, which its neutralising and deterative qualities make it an excellent vehicle for holding.

RECIPE No. 1.

- Pulv. Precipated chalk... 2 oz.—Antacid
 „ Borax 1 oz.—Refrigerent and detergent
 „ Super carb. of soda 1 oz.—Antacid and detergent
 „ Orris root, white... 1 oz.—Aromatic
 „ Cardomon seeds ... 4 dr.—Aromatic stimulant
 „ Castile soap 6 dr.—Stimulant detergent
 Oil of Bergamot, 10 or 12 drops—Flavour

The whole to be well incorporated and passed through fine muslin.

* "The Inhabitants of the Mouth and Teeth."—Schrott.

RECIPE No. 2.

- Pulv. Super carb. of soda 2 lb.—Antacid
 „ Orris root, white... $1\frac{1}{2}$ lb.—Aromatic
 „ Cinnamon $1\frac{1}{4}$ lb.—Astringent stimulant aro.
 „ Castile soap..... 1 lb.—Stimulant detergent
 „ White sugar 1 lb.—Palatable
 „ Gum myrrh..... 17 oz.—Stimulant astringent
 Neroli oil..... $\frac{1}{2}$ oz.—Flavour

RECIPE No. 3.

- Pulv. Calamas root 1 oz.
 „ Super carbonate of soda... 2 dr.
 Castile soap 2 dr.
 Oil of cloves..... 20 minims.

Good for scorbutic or ulcerated affections of the gums.

RECIPE No. 4.—*For the Nursery.*

- Pulv. Orris root, white 1 lb.
 „ Precipitated chalk 1 lb.
 „ White sugar 1 lb.

Astringent Tincture for the Gums.—No. 1.

- Tincture of Catechu..... 1 oz.
 Spirits of camphor 1 oz.

Mix, and dilute with an equal part of cold water when using.

No. 2.

- Tincture of rhatany..... 1 oz.
 Eau de Cologne 1 oz.
 Solution of chlorinated soda $\frac{1}{2}$ dr.

Mix, and dilute with water as above.

No. 3.

Sulphate of Alumina..... gr. xvi.

Solution of chlorinated soda 3 ij.

Honey $\frac{1}{2}$ oz.

Rose Water 4 oz.

Mix, and gargle two or three times a day, in diseased gums resulting from accumulation of tartar, and in prolonged cases of inflammation, accompanied with fœtor of the breath.

CHAPTER XVI.

THINGS WORTH NOTING.

Amongst things worth noting, perhaps I may be pardoned if I say a few words to parents on the impropriety of deceiving children. Every dentist who desires conscientiously to do his duty, knows how difficult it is to do so with those children who have lost confidence. They have no faith in what they are told, they cannot reason, and give way to passion or despair, and are pests in the operating room. Children suffer so much from decayed teeth, and are so frequently under the treatment of the dentist, either for relief from toothache, or for necessary extractions in regulating the second dentition, it is necessary he should have their confidence and esteem before he can do them much good; and he can never gain these if the child has been told, as an inducement to visit, that the dentist wont hurt it, and the first experience of his office is to find that it has

been told an untruth. Children should always be honestly dealt with and kindly treated, rather than confidence destroyed by deception. Teach them to endure a little present pain or discomfort for what will be an after good. Be sure every victory you have helped one of them to gain over their fears or their passions, not only gives force of character to the child, but establishes a firmer bond of love and confidence between the teacher and the taught. You may deceive a child once, but it is at the expense of loss of confidence and respect.

BRUSHING THE TEETH.—The teeth should be brushed every morning, upon their labial and on their lingual surfaces, with some dentifrice carried on a moderately hard toothbrush, made with the bristles standing so far apart as to give their elasticity full play. In brushing, the operation should not be confined to moving the brush across the faces of the teeth; it should also have a slight rotary movement, so that the bristles may spring between the teeth, and remove any particles of food or tartar that may have lodged between the interstices.

AN ANTACID.—To counteract the injurious effects to the teeth of acid contained in any prescription; wash the mouth before and after taking the mixture with a little sal-volatile and water. It is better than taking the mixture in a medicine spoon or through a glass tube.

EXCESSIVE BLEEDING.—To arrest excessive hemorrhage after tooth extraction, insert a pledget of cotton wool, saturated with the solution of perchloride of iron, into the cavity.

DISINFECTANT.—Permanganate of potass in the proportion of $\frac{1}{2}$ drachm to the pint of water, is a powerful disinfectant, and a very soothing and healing application to ulcers and burns. It removes the foetid odour, and causes the sore to assume a much more healthy character. If a few of the crystals, mixed with water and spread over a plate, be placed in a sick chamber, it removes any offensive smell.

2/a 2/-

2/a 2/-

